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EXAMINER	
HICKS, MICHAEL J	
ART UNIT	**PAPER NUMBER**
2165	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/644,344	GARTHWAITE, ALEXANDER T.	
	Examiner	Art Unit	
	Michael J. Hicks	2165	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 August 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/19/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-33 pending.

Claim Objections

2. Claims 26-29 objected to because of the following informalities:

As per Claims 26-29, each of the indicated claims fails to state from which claim it depends. For the purpose of further examination it will be assumed that each of claims 26-29 depend from independent Claim 25, which is also directed towards a electromagnetic signals.

Appropriate correction is required.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 25-33 rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 25-33 are directed towards electromagnetic signals. A product is a tangible physical article or object, some form of matter, which a signal is not. That the other two product classes, machine and composition of matter, require physical matter is evidence that a manufacture was also intended to require physical matter. A signal, a

form of energy, does not fall within either of the two definitions of manufacture. Thus, a signal does not fall within one of the four statutory classes of 35 U.S.C. 101.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-33 rejected under 35 U.S.C. 102(b) as being anticipated by Grarup et al. ("Incremental Mature Garbage Collection" Aarhus University, August 1993 and referred to hereinafter as Grarup).

As per Claims 1, 9, 17, and 25, Grarup discloses a method for breaking a futile collection cycle in a train algorithm (i.e. *"Whenever we perform a zero progress collection, in addition to carrying out the (futile) collection of the from car, evacuate at least one of the progress guarantee objects."* The preceding text excerpt clearly indicates that a futile collection cycle is broken by evacuating a progress guarantee object (e.g. an object which guarantees that at least one object is evacuated or reclaimed).) (Page 47, Paragraph 3), wherein a collection-set includes at least the oldest car in the oldest train (i.e. *"Since Car 1.1 is the lowest numbered car of the lowest numbered train in mature object space, it is selected as the from car."* The preceding text excerpt clearly indicates that the first car to be collected (e.g. the collection set) is the lowest numbered/oldest car of the lowest numbered/oldest train. Note that a futile collection cycle can occur in such a car.) (Page 41, Paragraph 3), the method comprising the steps of: determining when a futile cycle has been

entered (i.e. *"As we process a car, if we succeed in either moving an object out of it or reclaiming one when the car is freed, then certainly the progress property holds. Otherwise, we must have merely copied all objects in the from car to the end of the from train. We shall call this a zero progress collection. Note that for the progress property to hold, whenever we carry out a zero progress collection, we must guarantee that the situation does not repeat itself for all cars in the current pass."* The preceding text excerpt clearly indicates that it is determined that a futile cycle has been entered when a no progress collection occurs (e.g. when no objects are evacuated or reclaimed from the train).) (Page 46, Paragraph 4; Page 47, Paragraph1), identifying a car outside the collection-set in the oldest train, where the identified car contains an object referenced from outside the oldest train (i.e. *"Thus, external references to cars further down the train exist. We will use these external references to guarantee that the progress property holds, and so denote them progress guarantee references and the objects to which they point progress guarantee objects."* The preceding text excerpt clearly indicates that a car which is further down the train (e.g. a younger car) but outside the collection set is identified as being externally referenced (e.g. it is referenced from an object which is outside the oldest train).) (Page 47, Paragraph 2), adding the identified car to the collection to form an augmented collection-set (i.e. *"Whenever we perform a zero progress collection, in addition to carrying out the (futile) collection of the from car, evacuate at least one of the progress guarantee objects."* The preceding text excerpt clearly indicates that the progress guarantee object which was identified (e.g. the object referenced from an outside the oldest train) is evacuated. Note that because evacuation is a form of collection, the progress guarantee object (and therefore the car containing the progress guarantee object) must first be added to the collection set to form an augmented collection set. Also note that because the cars are from the same train and because the car in the original collection set is the oldest car in the train, any cars added to the collection set will be younger cars.) (Page 47, Paragraph 3), and collecting the augmented collection-set including scanning intervening cars (i.e. *"Recall that we are only recording remembered set references from higher to lower numbered cars, and so we can not easily*

perform evacuation of objects not located in the lowest numbered car. Fortunately, since the progress property does not require us to move the progress guarantee objects immediately, but allows us to postpone the evacuation until processing reaches the cars in which they reside, this does not force us to give up the approach outlined above." The preceding text excerpt clearly indicates that before the progress guarantee object can be evacuated (e.g. before the augmented collection set can be collected) processing must first reach the car in which the progress guarantee object resides (e.g. the car added to the collection set). Due to the fact that cars are processed according to age (e.g. the oldest car to the newest car) and the collection set includes the oldest car of the oldest train, all cars between the oldest car and the car in which the progress guarantee object resides (e.g. all intervening cars) will be processed/scanned in during the collection of the augmented collection set.) (Page 47, Paragraph 4).

As per Claims 2, 10, 18, and 26, Grarup discloses using information about the references to objects in cars in the oldest train collected during prior collections (i.e. *"Since Car 1.1 is the lowest numbered car of the lowest numbered train in mature object space, it is selected as the from car...Otherwise, if the collection was of the zero progress type, and we are not currently holding a progress guarantee reference, then select any of the external references to the from train as the progress guarantee reference."* The preceding text excerpt clearly indicates that the cars which are in the collection set may be in the oldest train and that a progress guarantee reference (e.g. an object which is referenced from outside the train / information about the references to objects in cars in the train) may already be held at the time of collection and that it is used. This further indicates that the progress guarantee reference was noted in a prior collection of the train.) (Page 41, Paragraph 3; Page 48, Paragraph 3).

As per Claims 3, 11, 19, and 27, Grarup discloses using information about the references to objects in cars in the oldest train collected during the current collection (i.e.

"Since Car 1.1 is the lowest numbered car of the lowest numbered train in mature object space, it is selected as the from car...Otherwise, if the collection was of the zero progress type, and we are not currently holding a progress guarantee reference, then select any of the external references to the from train as the progress guarantee reference." The preceding text excerpt clearly indicates that the cars which are in the collection set may be in the oldest train and that a progress guarantee reference (e.g. an object which is referenced from outside the train / information about the references to objects in cars in the train) may selected and utilized during the current collection.) (Page 41, Paragraph 3; Page 48, Paragraph 3).

As per Claims 4, 12, 20, and 28, Grarup discloses the reference from outside the oldest train is a reference from a younger train (i.e. *"Since Car 1.1 is the lowest numbered car of the lowest numbered train in mature object space, it is selected as the from car...So far, we have not made any progress in moving objects out of the train, but we are hoping to do so because of the external reference to object B...Technically, the root need not reside outside mature object space, but could just as well be a pointer from another train...Thus, external references to cars further down the train exist. We will use these external references to guarantee that the progress property holds, and so denote them progress guarantee references and the objects to which they point progress guarantee objects."* The preceding text excerpt clearly indicates because the from car (e.g. the original collection set) is in the oldest train (as noted in the preamble to parent claim) and because the references are external references (e.g. from outside the current train), the references are from younger trains (e.g. any train which externally references the *oldest* train must be a younger train).) (Figure 4.12; Page 41, Paragraph 3; Page 45, Paragraph 4; Page 46, Paragraph 3; Page 47, Paragraph 2).

As per Claims 5, 13, 21, and 29, Grarup discloses the reference from outside the oldest train is a reference from outside the generation (i.e. *"In the following we shall sometimes*

use Hudson & Moss's terminology and refer to the oldest generation (subject to collection by the Train algorithm,) as mature object space...So far, we have not made any progress in moving objects out of the train, but we are hoping to do so because of the external reference to object B...Technically, the root need not reside outside mature object space, but could just as well be a pointer from another train...Thus, external references to cars further down the train exist. We will use these external references to guarantee that the progress property holds, and so denote them progress guarantee references and the objects to which they point progress guarantee objects." The preceding text excerpt clearly indicates that the references from outside the train are external references, and that external references may be from outside the mature object space (e.g. oldest generation). Note that the oldest train, in which the collection set resides (as noted in the preamble to parent claim), is in the oldest generation.) (Figure 4.12; Page 45, Paragraph 4; Page 46, Paragraph 3; Page 47, Paragraph 2).

As per Claims 6, 14, 22, and 31, Grarup discloses the step of determining comprises the steps of: measuring the volume of the oldest train before a collection (i.e. *"As we process a car, if we succeed in either moving an object out of it or reclaiming on when the car is freed, then certainly the progress property holds...When we collect Car 1, we notice in the new Step 5 that the collection was of the zero progress type, and we therefore record a progress guarantee reference."* The preceding text excerpt clearly indicates that during collection, it is noted whether or not either an object was moved out of the train or if an object was reclaimed (e.g. whether the volume of the train / number of objects in the train has changed). In order to make this determination the volume of the train would have to be measured both before and after a collection. Note that as in the parent claim, the train being referenced is the oldest train.) (Page 46, Paragraph 4; Page 48, Paragraph 3), measuring the volume of the oldest train after a collection (i.e. *"As we process a car, if we succeed in either moving an object out of it or reclaiming on when the car is freed, then certainly the progress property holds...When we collect Car 1, we notice in the new Step 5 that the collection was of the zero progress type, and we therefore record a progress guarantee reference."* The preceding text excerpt clearly

indicates that during collection, it is noted whether or not either an object was moved out of the train or if an object was reclaimed (e.g. whether the volume of the train / number of objects in the train has changed). In order to make this determination the volume of the train would have to be measured both before and after a collection. Note that as in the parent claim, the train being referenced is the oldest train.) (Page 46, Paragraph 4; Page 48, Paragraph 3), wherein if no volume reduction has been found, a futile collection cycle has been entered (i.e. *"As we process a car, if we succeed in either moving an object out of it or reclaiming on when the car is freed, then certainly the progress property holds...When we collect Car 1, we notice in the new Step 5 that the collection was of the zero progress type, and we therefore record a progress guarantee reference."* The preceding text excerpt clearly indicates that if it is determined that the volume of the train has not changed (e.g. the progress property has not been upheld) the collection was a zero progress collection and a futile collection cycle has been entered.) (Page 46, Paragraph 4; Page 48, Paragraph 3).

As per Claims 7, 15, 23, and 32, Grarup discloses establishing a threshold for the number of times that a collection cycle has resulted in no reduction in the volume of the collection set (i.e. *"For instance, the requirement that there be progress at every pass of the train, as expressed in Lemma 4.5, is not crucial to the proof of Lemma 4.6; we could just as well have required that objects be moved out of the from train at every invocation of the algorithm, or at every fifty passes, or that we never perform a thousand zero progress collections in a row, or something similar."* The preceding text excerpt clearly indicates that a threshold is established that 1,000 zero progress collections (e.g. collection cycles which have resulted in no reduction in the colume of the collection set) may not result in a row.) (Page 53, Paragraph 7), saving the number of times that a collection cycle has resulted in no reduction in the volume of the collection set (i.e. *"For instance, the requirement that there be progress at every pass of the train, as expressed in Lemma 4.5, is not crucial to the proof of Lemma 4.6; we could just as well have required that objects be moved out of the from train at*

every invocation of the algorithm, or at every fifty passes, or that we never perform a thousand zero progress collections in a row, or something similar." The preceding text excerpt clearly indicates that a threshold is established that 1,000 zero progress collections (e.g. collection cycles which have resulted in no reduction in the volume of the collection set) may not result in a row. In order to implement this restriction, a counter which saves the number of zero progress collections (e.g. collection cycles which have resulted in no reduction in the volume of the collection set) must exist in the system.) (Page 53, Paragraph 7), wherein when the threshold is reached a futile collection cycle has been entered (i.e. *"For instance, the requirement that there be progress at every pass of the train, as expressed in Lemma 4.5, is not crucial to the proof of Lemma 4.6; we could just as well have required that objects be moved out of the from train at every invocation of the algorithm, or at every fifty passes, or that we never perform a thousand zero progress collections in a row, or something similar."* The preceding text excerpt clearly indicates that when the threshold of zero progress collections (e.g. collection cycles which have resulted in no reduction in the volume of the collection set) is reached, a futile collection cycle is detected and the steps outlined above to break the futile collection cycle are taken.) (Page 53, Paragraph 7, Also see Page 52, Lemma 4.5 (Progress)).

As per Claims 8, 16, 24, and 33, Grarup discloses tracking the number of times on a no progress counter that a collection cycle has resulted in no reduction in the volume of the oldest train (i.e. *"For instance, the requirement that there be progress at every pass of the train, as expressed in Lemma 4.5, is not crucial to the proof of Lemma 4.6; we could just as well have required that objects be moved out of the from train at every invocation of the algorithm, or at every fifty passes, or that we never perform a thousand zero progress collections in a row, or something similar."* The preceding text excerpt clearly indicates that a threshold is established that 1,000 zero progress collections (e.g. collection cycles which have resulted in no reduction in the volume of the collection set) may not result in a row. In order to implement this restriction, a counter which saves the number of zero

progress collections (e.g. collection cycles which have resulted in no reduction in the volume of the collection set) must exist in the system.) (Page 53, Paragraph 7), and comparing the no progress counter to the threshold (i.e. *"For instance, the requirement that there be progress at every pass of the train, as expressed in Lemma 4.5, is not crucial to the proof of Lemma 4.6; we could just as well have required that objects be moved out of the from train at every invocation of the algorithm, or at every fifty passes, or that we never perform a thousand zero progress collections in a row, or something similar."* The preceding text excerpt clearly indicates that a threshold is established that 1,000 zero progress collections (e.g. collection cycles which have resulted in no reduction in the volume of the collection set) may not result in a row. In order to implement this restriction, a counter which saves the number of zero progress collections (e.g. collection cycles which have resulted in no reduction in the volume of the collection set) must exist in the system, and the counter must compare its currently stored information with the threshold.) (Page 53, Paragraph 7).

As per Claim 30, Grarup discloses if no younger cars are found with objects referenced from younger trains, then finding and adding a car with an external reference to the collection set to form a second augmented collection set (i.e. *"Otherwise, if the collection was of the zero progress type, and we are not currently holding a progress guarantee reference, then select any of the external references to the from train as the new progress guarantee reference."* The preceding text excerpt clearly indicates that if no younger cars in the train are found with objects references from younger trains/external references (e.g. we are not currently holding a progress guarantee reference), then an object is found with an external reference is found and the object, along with its car is added to the collection set to form a second augmented collection set.) (Page 48, Paragraph 4), and collecting the second augmented collection set (i.e. *"Contrary to the situation in Figure 4.14, we have now explicitly recorded the fact that B was once reference directly from a root, and so even though this is no longer the case, we evacuate it at the next invocation of the*

algorithm, thereby ensuring progress and satisfying the progress property." The preceding text excerpt clearly indicates that B (in the second augmented collection set) is evacuated (e.g. evacuation being a form of collection, the second augmented collection set is collected at the next evocation of the algorithm and the progress property is satisfied).) (Page 48, Paragraph 4).

Points of Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael J. Hicks whose telephone number is (571) 272-2670. The examiner can normally be reached on Monday - Friday 8:30a - 5:00p.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jeffrey Gaffin can be reached on (571) 272-4146. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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